CLAIMS

1. A method to clean refractory oxides from a surface of a component comprising metals or metal alloys, including

immersing of the surface of the component in a molten salt which dissolves a refractory oxide on said surface; and

removing the component from the molten salt with salt adhering to the surface which then rapidly solidifies and acts as a shield to retard re-oxidation of the surface.

2. The method of claim 1, in which the molten salt comprises a mixture of alkaline hydroxides in a low melting eutectic composition.

3. The method of claim 2 in which the mixture of alkaline hydroxides includes an essentially pure potassium hydroxide and essentially pure sodium hydroxide, mixed in the proportions of about 59 weight percent potassium hydroxide and about 41 weight percent sodium hydroxide.

4. The method of claim 1, wherein the metal or metal alloy is characterized by a critical annealing or transition temperature, and in which the molten salt comprises an essentially pure hydroxide with a melting temperature below the critical annealing or transition temperature.

5. The method of claim 1, wherein the metal or metal alloy is characterized by a critical annealing or transition temperature, and in which the molten salt comprises an essentially pure hydroxide with a melting temperature below the critical annealing or transition temperature, the essentially pure hydroxide being a member of a group including sodium hydroxide, potassium hydroxide, and lithium hydroxide.

6. The method of claim 2, in which the eutectic composition is comprised of lithium hydroxide and potassium hydroxide, mixed in the proportions of 84 weight percent potassium hydroxide and 16 weight percent lithium hydroxide.

7. The method of claim 1, in which the molten salt comprises a low melting mixture of two or more essentially pure hydroxide salts.

8. The method of claim 1, in which the molten salt contains dissolved ions of metal more electropositive than the metals or metal alloys of the component.

9. A method for manufacturing a device including a component comprising metals or metal alloys, including:

immersing of the surface of the component in a molten salt which dissolves a refractory oxide on said surface;

removing the component from the molten salt with salt adhering to the surface which then rapidly solidifies and acts as a shield to retard re-oxidation of the surface;

heating and applying a solder on the surface of the component, wherein the adhering salt on the surface melts and serves as a flux; and

joining the component to another member using the solder.

10. The method of claim 9, in which the molten salt comprises a mixture of alkaline hydroxides in a low melting eutectic composition.

11. The method of claim 9 in which the mixture of alkaline hydroxides includes an essentially pure potassium hydroxide and essentially pure sodium hydroxide, mixed in the proportions of about 59 weight percent potassium hydroxide and about 41 weight percent sodium hydroxide.

12. The method of claim 9, wherein the metal or metal alloy is characterized by a critical annealing or transition temperature, and in which the molten salt comprises an essentially pure hydroxide with a melting temperature below the critical annealing or transition temperature.

13. The method of claim 9, wherein the metal or metal alloy is characterized by a critical annealing or transition temperature, and in which the molten salt comprises an essentially pure hydroxide with a melting temperature below the critical annealing or transition temperature, the essentially pure hydroxide being a member of a group including sodium hydroxide, potassium hydroxide, and lithium hydroxide.

14. The method of claim 9, in which the eutectic composition is comprised of lithium hydroxide and potassium hydroxide, mixed in the proportions of 84 weight percent potassium hydroxide and 16 weight percent lithium hydroxide.

15. The method of claim 9, in which the molten salt comprises a low melting mixture of two or more essentially pure hydroxide salts.

16. The method of claim 9 in which the solder material comprises essentially pure tin.

17. The method of claim 9 in which the solder material comprises an alloy nominally comprised of tin and silver, nominally with a range from just over 0 to about 6 weight percent silver.

18. The method of claim 9 in which the solder material comprises an alloy of gold and tin, nominally 80 weight percent gold, 20 weight percent tin.

19. The method of claim 9 in which the solder material comprises an alloy in which principal materials comprise lead and tin in various proportions.

20. The method of claim 9 in which the surface of the component comprises a superelastic or shape memory type nickel-titanium alloy with a composition at or near 50 weight percent of each component.

21. The method of claim 9 in which the surface of the component comprises a stainless steel or similar alloy whose major constituent is iron together with chromium and nickel in various proportions.

22. The method of claim 8 in which a metal more electropositive than the metal of the component is deposited on the surface from a second molten salt containing dissolved ions of said electropositive material.

23. A method for manufacturing a device including a component comprising metals or metal alloys, including:

immersing of the surface of the component in a first molten salt which acts as a flux to dissolve refractory oxide on said component;

removing the component from the first molten salt with salt adhering to the surface which then rapidly solidifies and acts as a shield to retard re-oxidation of the surface; and

immersing the component in a second molten salt containing dissolved ions of a metal more electropositive than the metals or metal alloys of the component to obtain a layer of the electropositive metal plated on the surface of the component as a result of electrolytic displacement reaction.

24. The method of claim 23 in which the first molten salt comprises a mixture of alkaline hydroxides in a low melting eutectic composition.

25. The method of claim 23, wherein the metal or metal alloy component is characterized by a critical annealing or transition temperature, and in which the first molten salt comprises an essentially pure hydroxide with a melting temperature below the critical annealing or transition temperature.

26. The method of claim 23 in which the first mixture of alkaline hydroxides includes an essentially pure potassium hydroxide and essentially pure sodium hydroxide, mixed in the proportions of about 59 weight percent potassium hydroxide and about 41 weight percent sodium hydroxide.

27. The method of claim 23 in which the first molten salt comprises an essentially pure hydroxide with a melting temperature below the critical annealing or transition temperature, the essentially pure hydroxide being a member of a group including sodium hydroxide, potassium hydroxide, and lithium hydroxide.

28. The method of claim 23 in which the first molten salt is a eutectic composition comprised of lithium hydroxide and potassium hydroxide, mixed in the proportions of 84 weight percent potassium hydroxide and 16 weight percent lithium hydroxide.

29. The method of claim 23 in which the surface of the component comprises a superelastic or shape memory type nickel-titanium alloy with a composition at or near 50 weight percent of each component.

30. The method of claim 23 in which ions of the electropositive metal are introduced into the second molten salt by dissolving therein compounds of said metal.

31. The method of claim 23 in which the second molten salt acting as solvent is a eutectic mixture of sodium hydroxide and potassium hydroxide.

32. The method of claim 23 in which the second molten salt acting as solvent is an essentially pure alkaline hydroxide.

33. The method of claim 23 in which the second molten salt acting as solvent is a eutectic mixture of lithium hydroxide and potassium hydroxide.

34. The method of claim 23, in which the second molten salt comprises a low melting mixture of two or more essentially pure hydroxide salts.

35. The method of claim 23 in which the electropositive metal comprises tin.

36. The method of claim 23 in which tin-containing ions are introduced into the solvent second molten salt by dissolving a tin compound in said molten salt.

37. The method of claim 23 in which tin-containing ions are introduced into the solvent second molten salt by dissolving a tin compound in said molten salt, and wherein the tin compound is tin oxide containing tin in a tetravalent ionic state.

38. The method of claim 23 in which tin-containing ions are introduced into the solvent second molten salt by dissolving a tin compound in said molten salt, and wherein the tin compound is tin oxide containing tin in a divalent ionic state.

39. The method of claim 23, including soldering the component to another member.